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TELEVISION VIDEO AMPLIFIER and AGC SYSTEMS*

D-C Restorers . . . Picture-Tube Signal Circuits . . . Video Amplifier Systems in G. E. 801, RCA 630TS and Farnsworth FV200 . . . Automatic Gain Control Circuits in Current Models

In the discussion of tv-receiver video amplifiers, d-c restorers in grid rectified systems were analyzed.

Another type of d-c restorer is the diode type (Fig. 1), which is connected in the grid circuit of the picture tube. When this type is used no direct-coupling is required and the video output tube is capacitor-coupled to the picture tube. In this particular circuit a diode is connected between grid and ground through an isolating resistor, R_3. A negatively-polarized composite signal is applied to its cathode through an isolating resistor, R_5, and capacitor, C_1. The peak-diode current drawn during the sync tip (drives cathode furthest negative) develops a positive voltage across R_1 and charges capacitor, C_1. Again the R_1-C_1 time constant is long enough to hold this charge between sync tips. The charge of course, reduces the bias on the grid of the picture tube. The higher the average brightness, the higher the peak diode current, and the higher the positive charge on C_1. Thus, there is less bias on the grid of the picture tube, and background illumination of the screen is at its highest as it should be.

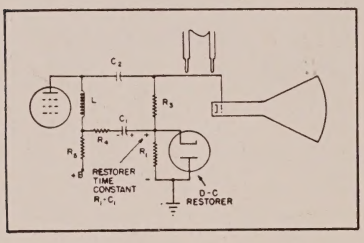


Fig. 1. A diode type of d-c restorer.

The a-c component of signal is capacitor coupled from the plate of the video output to the picture-tube grid. Resistor R_3 prevents shunting of the high-frequency components of the picture signal by the capacity of the diode. Resistor R_4 prevents the conducting diode from shunting the plate resistor of the video-output tube.

Two advantages of the diode-type restorer, as compared to the grid-rectifier type, are improved linearity as to brightness changes and operation of video output with higher gain. With the grid rectifier type, the output tube is zero biased (no signal) and screen voltage must be kept down to prevent

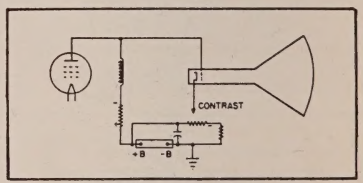


Fig 1a. The signal and bias circuit of a picture tube with d-c coupling.

* *By Edward M. Noll in "Service," from a forthcoming book, "Television for Radiomen," to be published by Macmillan.*

excessive plate current. Lower screen voltage, of course, means less gain.

Picture-Tube Signal Circuit

The picture-signal circuit or control grid-to-cathode circuit has, when d-c coupling is used, four distinct voltages applied to it. These voltages are alternating component of picture signal, d-c component of picture signal (average negative voltage drop across video-output load resistor), plate-voltage supply of video-output tube, and picture-tube cathode bias supply.

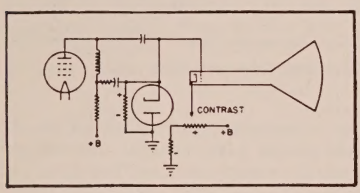


Fig. 2. Signal and bias circuit with a diode-restorer.

When direct-coupling is used the positive plate voltage of the output tube (Fig. 1a) is applied to the grid of the picture-tube. If a negative bias is to be supplied to the grid of the picture tube it means a more positive voltage must be applied to the cathode to overcome the positive-grid voltage.

Brightness Potentiometer

The cathode voltage is made adjustable by means of the brightness potentiometer. It sets the level of picture tube brightness and is adjusted to proper degree of screen illumination for comfortable viewing.

When a diode d-c restorer is used ahead of the picture-tube (Fig. 2), a much lower positive voltage is applied to the cathode, as there is no need to overcome a high positive grid voltage. The only positive voltage applied to the grid is the d-c component of voltage developed by the conducting diode d-c restorer. Brightness control is again a potentiometer in the cathode circuit.

Typical Video Amplifier Circuits

In Fig. 3 appears the video amplifier of the G.E. 801. Here the amplifier is direct-coupled from detector to the cathode of the picture tube. In this video amplifier no d-c restorer is necessary because the output of the video detector is the single polarity signal with the blanking and sync tip level constant. The negative polarity composite signal, which is developed across the diode load resistor R_{14}, is direct coupled to the 6AC7 video amplifier. In fact, the diode load resistor also serves as the grid resistor of the

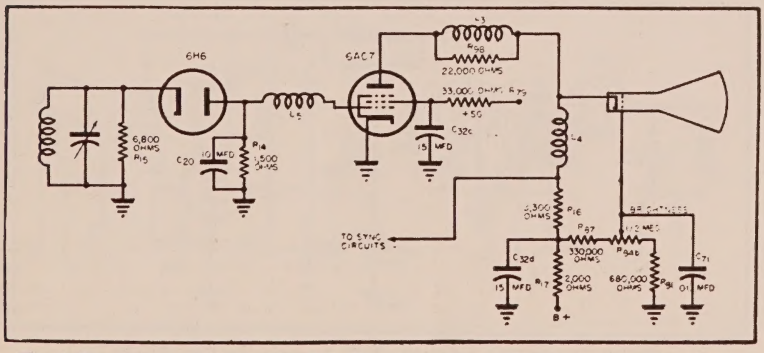


Fig. 3. The video amplifier of the G.E. 801 where the amplifier is direct coupled from the detector to the cathode of the picture tube.

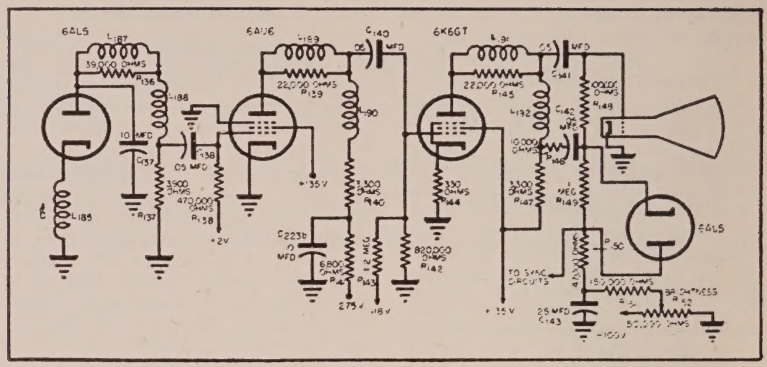


Fig. 4. The RCA 630TS video amplifier with two amplifier tubes.

video amplifier. Whenever modulation is detected a negative voltage appears across R_{14} and therefore, on the grid of the video amplifier. The i-f band-pass filter consists of capacitors C_{20}, inductor L_6, and the input capacity of the video output tube. The plate of the video output tube is direct coupled to the cathode of the picture tube. Inasmuch as the signal is negative on the grid of the video amplifier it is a positive composite signal which is direct-coupled to the cathode of the picture tube. In effect it is the same as applying a negative-polarized signal to the grid of the picture tube. Series-shunt peaking is used in the output stage and a portion of the signal developed across the plate-load resistor R_{18} is also coupled into the sync circuits of the receiver. A positive voltage is applied to the grid of the picture tube through a bleeder network and the brightness potentiometer R_{84b}. The positive voltage, applied to the grid of the picture tube, is negative with respect to the positive voltage direct coupled to the cathode of the picture

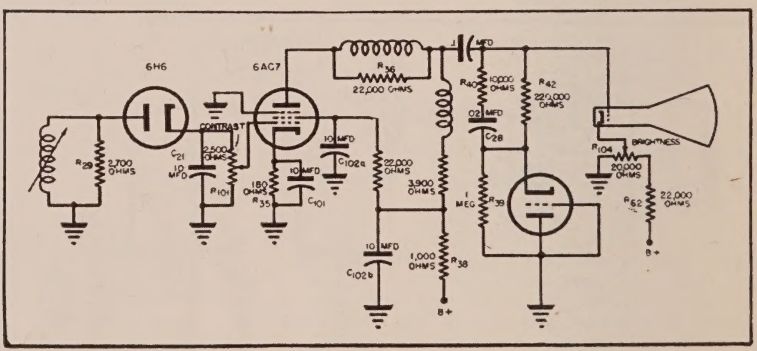


Fig. 5. Video-amplifier system of the Farnsworth FV200. A 2,500-ohm potentiometer, video detector load resistor, serves as the contrast control.

tube by the proper amount, to set the bias for the picture tube.

In the video amplifier of the RCA 630 TS tv receiver (Fig. 4), there are two video amplifier tubes. Capacitive coupling is used between the video detector and the video amplifier stages with a d-c restorer tube located in the grid circuit of the picture tube. A portion of the composite signal also appears across resistor R_{150} and is coupled into the sync circuits. The cathode of the picture tube is grounded and negative voltage is applied to the brightness potentiometer and the decoupling resistor, R_{151}, to the grid of the picture tube. The cathode of the video amplifier tubes are also grounded and a negative voltage is applied to the grid setting the bias for each tube. The high frequency components of the signal are sustained by a combination series shunt peaking system. A negative composite signal is developed across the video detector load resistor and it appears positive in the plate circuit of the first video amplifier and negative at the plate circuit of the second video amplifier. Consequently, a negative signal is applied to the grid of the picture tube.

In the Farnsworth tv model, FV-200 (Fig. 5) the video-detector-load resistor is a 2500-ohm potentiometer which serves as the contrast control for the receiver. The signal is direct-coupled to the grid of the video amplifier. The video detector is connected with the proper polarity to give a positive composite signal at its output and of course, this signal appears negative in the plate circuit of the video amplifier and therefore negative on the control grid of the picture tube. The d-c restorer is located in the grid circuit of the picture tube and is actually a triode with the grid and plate connected together to form a diode. The positive voltage is applied to the cathode of the picture tube through the brightness potentiometer, R_{104}.

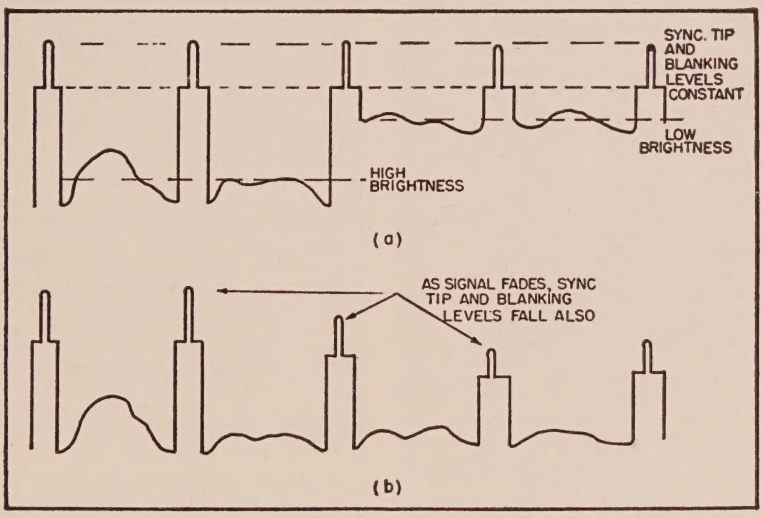


Fig. 6. Change in signal distribution with changes in average brightness and fading.

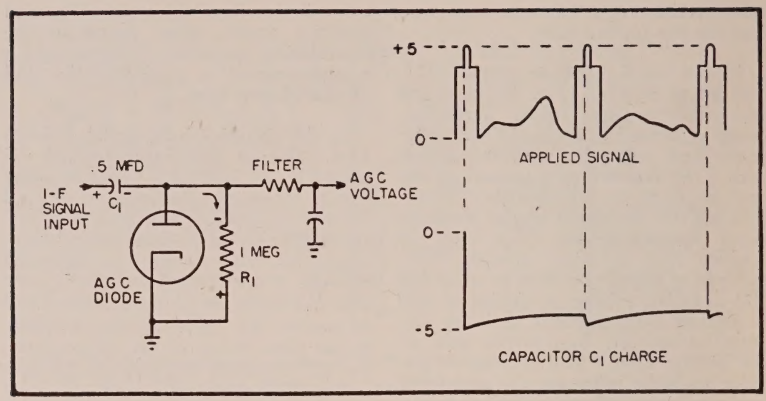


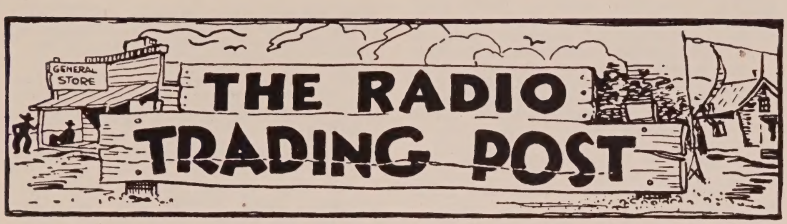
Fig. 7. A simple agc system.

Automatic-Gain Control Systems

To take care of variation in signal strength many television receivers use an automatic gain control (agc) or automatic brightness control system. The agc circuit varies the gain of the i-f amplifiers of the receiver and keeps the peak amplitude of the i-f signal delivered to the video detector essentially constant with substantial variations in received signal strength. The agc system of a tv receiver is comparable with the avc system of a broadcast receiver with the exception that control voltage is set by the peak amplitudes of the received signals or the sync tip, while in the avc system of a broadcast receiver the control voltage is proportional to the average strength of the received signal. In the tv system we know that the average signal strength varies with the average brightness of the scene which is transferred. This variation in average signal strength sets the average background brightness of the tv picture tube and we do not want the agc system to operate with changes in average brightness. It is true that fading also causes the average signal strength to vary and would therefore effect the background brightness of our scene at a time when we would not want it to.

The one important difference between the change in average signal strength caused by fading and the change in average signal strength caused by a change in scene brightness, is that the peak amplitude of the tv signal (blanking level and sync tip levels) does not vary when the brightness of the televised scene changes because the blanking level and sync tip level are held constant at the 75% and 100% levels, respectively, of the transmitted composite signal. The amplitude of the received signal during the blanking and sync tip intervals is a constant regardless of the variation in scene brightness. However, when fading is present not only is the picture portion of the signal affected, but also fading causes a loss in amplitude of the blanking and sync tip levels. This variation in the peak amplitude of the television signal by fading is the variation which is used to operate the agc system in a tv receiver. Therefore, the negative agc voltage is proportional to the peak amplitude of the received sync tip which, of course, is only affected by fading and not by changes in the televised scene brightness. See Fig. 6.

A simple agc system is shown in Fig. 7. In this circuit a portion of the i-f signal present at the video detector tuned-circuit is coupled through a large capacitor to the plate of a diode.



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FOR SALE—Zeiss Ikoflex camera. f 3.5 Triotar lens, compur shutter, automatic loading. Brand new. Elaine Sherich, 565 W. 139 St., New York, N. Y.

WANTED — Position in radio repair shop, afternoons, in vicinity of New York City. Young man, 30, recent graduate of American Radio Institute, New York, N. Y. Salary secondary; practical experience is my primary interest. Richard Lewis, 1873 Union Ave., Bronx, N. Y.

FOR SALE — 1947 NRI radio, television course, 65 lessons, six experiment kits and books, kits complete, soldering iron included, extra data books, $27.50. Radio Service, 1504 Hayes St., Muskogee, Okla.

TRADE — Signal Generator Philco model 088. Need Rider's manuals, 1-5, abridged —11, 14, 15. Will trade for any two. Walter Noble, 1838 Lamont St., N.W., Washington 10, D. C.

FOR SALE — New "Electromatic" Phonograph, 3-tube amplifier, light indicator, volume and tone control, astatic pickup, 6-inch speaker. New vertical copper antenna, 12-foot, 4 sections, all for $20 f.o.b. Herman Fischer, 626 Carlton Ave., Brooklyn 17, N. Y.

FOR SALE — Tubes, 75 per cent off. Write for list. Hunter's Radio Shop, 450 Main St., Catskill, N. Y.

FOR SALE — Radiomarine Receiver Model 8510, 14-650 kc, 4 bands. Assorted xtals for Navy "TBS" receiver and trans. Westinghouse meters and other sound and radio parts. New York Electric Co., 221 East 85th St., New York 28, N. Y.

FOR SALE — Kit of 5 tubes: 12SA7, 12SK7, 12SQ7, 35Z5, 35L6 or 50L6, Standard Brand kit of 5 tubes, $2.60. Minimum order, 5 kits. Harry E. Shulman, 305 80th St., Brooklyn, N. Y.

FOR SALE — 55 watt public address system, including chromium floor stand. Excellent condition. Write Norton Tatz, 2740 Logan Boulevard, Chicago 47, Illinois.

FOR SALE — T-23/ARC-5 Xmitters 100-156 mc. auto-tuned. Like new, with tubes, less crystals, $10. Schematics and other data available. SCR-522 Schematics. Set of 4, $1.00. W2GVF, 98 Bodine, Staten Island 10, N. Y.

WANTED — Position by young man, 18, as serviceman or radio salesman in or near Central, La. Qualified serviceman but has had little expereince. Would consider small salary to start. Eddie Lemoine, P.O. Box 54, Moreauville, La.

WANTED — Preselector for 80-40-20-10, new or used. Have large stock of new transformers, chokes, meters, condensers, tubes, etc., to swap. W3BBV, P.O. Box 722, York, Penn.

SELL OR TRADE — Precision Model 500B tester, test tubes to 117 V., complete with charts and metal counter case, $20. Need 20,000 ohm per volt multimeter. John L. Campbell. 2034 East 26th St., Brooklyn 29, N. Y.

SELL OR TRADE — Send for list of radio equipment. Need midget modulation transformer, etc. Frank Bou, c/o Bot. Dept. University of Pennsylvania, 38 Woodland Ave., Philadelphia 4, Pa.

SWAP OR SELL — Army surplus transmitter model 375c, one armchair model radio phonograph combination has Webster model 50 record changer. Make offer. Looking for a Graflex Reflex camera, any size from 3 1-4 x 4 1-4 to 5 x 7. Radio Sales and Service, 1009 W. Barnes Ave., Appleton, Wis.

FOR SALE — Miscellaneous parts, sets and books. Send for list. Livingstone Electronic Laboratory, Ellis Ave., Fair Lawn, N. J.

WANTED — Push-button locking bar used in Selectronne unit. Will purchase complete unit if necessary. Will trade new Talk-a-phone sub-station units for Rider's Manuals, or will sell. Radio Technical Service, 2821 W. Girard Ave., Philadelphia, Pa.

SELL OR TRADE — Large variety of Table Fans and Ventilating Fans, also Washing Machine Motors of popular makes, some as low as $5.00 each; or will trade for small radios or testing meters. Supreme Electric Company, 1335 Butternut St., Detroit 16, Mich.

SELL OR TRADE — Clough-Brengle Sig. Gen. Model OCA; Solar Anz. Model CB; RCP multimeter M447; Superior Tube Tester M450. Child's Book of Knowledge, 22 vols. Best offer for all or part. Lyman's Radio Shop, Box 186, Williston, Florida.

FOR SALE — Radio sales, service, record and novelty store. Good going business in town of about 4,000. Good rural district and three small towns within two-mile radius. Price, $8,500. Moore's Radio Shoppe, 513 Grand Ave., Little Chute, Wis.

FOR SALE — Less than year old, Jackson 640 test OSC, 636 Portable Tube Checker, Ghirardi's handbook, G.E. 35 to 39 Service Book. All for $100. E. J. Miller, 155 Glenwood Rd., Elizabeth, N. J.

WANTED — Dumont type 224A Cathode ray oscilloscope or equivalent. W. Richman, 3438 90th St., Jackson Heights, L. I., N. Y.

FOR SALE — Good set of hearing aids (Sonatone). Make offer. All they need is the small 4.5 v. battery; ear fone fits into ear. Norman Olstad, 706 Holms Ave., La Porte, Texas.

SELL OR SWAP — Jap rifle, electric drill, AC voltmeter, DC milliammeter, bathtub condensers, tubes, isolation transformers. All in good condition. Need tube tester and signal generator. L. L. Waite, CSK, Supply Department, USN School, Bainbridge, Md.

SELL OR TRADE — Air King wire recorder, $129. Webster wire recorder, $145. Also have battery operated wire recorders. Wire Recorder, Arlington Heights, Ill

FOR SALE — New Supreme 561, Dumont 274, extra CR tube. Used about 40 hours. Ed Kane, S.S.H., Quincy, Ill.

FOR SALE — Hallicrafters S21-9 tubes. 27-68 MC. Excellent condition. External "R" meter. Frank J. Slabinak, 3206 S. Maple Ave., Brookfield, Ill.

WANTED — Amertran 6200 v. ct. 700 ma. plate transformer or similar. Also 500 ma. filter chokes, meters, and other parts. Eddie Howell, Gen. Del., Gastonia, No. Caro.

WANTED — Rider's Manuals volumes 4 to 16. State volume numbers and price. A. A. Billmeyer, 2257 Blendon Pl., St. Louis 17, Mo.

WANTED — Input SF Transformer tuned to 455 KC for model 4K-600 Zenith portable radio. This part measures only 3-4 in. x 1 1-4 in. James Dotson Service Repair, 122 Oat St., Norton, Va.

FOR SALE — 2 meter RCVR. Tunes 138 to 158 MC.; 10 tubes, 4 IF stages; 2 RF stages, R Meter. Make offer. F. J. Slabinak, 3206 S. Maple Ave., Brookfield, Ill.

WANTED — Record shop. Am a partially disabled veteran, and have small capital to invest. Ben Gerstein, 456 Brooklyn Ave., Brooklyn 25, N. Y.

FOR SALE — One Television set, 18 tubes, in floor model cabinet, complete with AM tuner. M. Schwab, 5219 9th Ave., Brooklyn 20, N. Y.

FOR SALE OR TRADE — One Neptune 1 1-2 h.p. outboard motor and one Neptune twin 4 h.p. outboard motor. Like new—never used. M. Levengood's Radio Shop, Sheridan, Penn.

WANTED — Good SW Receiver which covers all bands. Must be for 110 v. operation. Rudy's Radio Center, 222 Putnam St., Manchester, N. H.

WANTED — Information on how to convert wireless set No. 19, MARH II to 110 v. A.C. Meredith Atkins, 110 North Ave., Sumner, Ill.

SWAP — Four UG-21/U Male HF Coax connectors for equal number of Amphenol 83 series connectors. D. M. Frantz, 1400-B Washington, Amarillo, Texas.

FOR SALE — Hallicrafters, S-41G, 7 tubes. Changed over to AC. Make offer. Frank J. Slabinak, 3206 S. Maple Ave., Brookfield, Ill.

TRADE OR SELL — 22 jewel Hamilton Air Force pocket watch, like new; 8mm. movie camera; 16 mm. movie projector; 60 power telescope; 8 x 30 prism binoculars; want Super Pro, HRO, SX-28-A, complete, or what have you? Fred Simonian, 85 Shepard St., Lynn, Mass.

WANTED — Position, part time in Brooklyn store. American, white, 42; wants radio serviceman's job part time; 20 years' experience all makes and models. Clarence C. Bogert, 216 5th Ave., Brooklyn 15, N. Y.

SWAP — Nine pre-war golf clubs and bag for signal generator or signal tracer. Describe make, model and condition. Emanuel Erlic, 1523 Unionport Road, New York 62, N. Y.

WANTED — Position, young man, 19, desires a position in service department of manufacturer. Experienced in servicing and building. Will go to New Jersey or Pennsylvania. Alvin Sydnor, 407 Gartside Ct., Chester, Pa.

SELL OR SWAP — Hallicrafters Model S-36A UHF and miscellaneous equipment. Need BC portable radio with RF stage, binoculars, typewriter, or good camera. Raymond H. Ives, 822 Windsor Ave., Norfolk 4, Va.

SELL OR SWAP — Nelson M. Cooke Mathematics book, Rogers' Mechanical drawing and design, Audel's Mechanical drawing; all new. Want tube tester or some of Rider's early Manuals. J. L. Farabee, 1301 Webb Rd., Lakewood 7, Ohio.

TRADE OR SELL — Practical course in Modern Locksmithing by Nelson-Hall Co., like new; will trade for Radio Troubleshooter's Handbook by Ghirardi. Cookson, Box O, Puxico, Mo.

SELL OR SWAP — Astatic S-8, T-30 mike, Turner CX mike, Wirgin 35 mm. f. 2.9, with case; 10 volumes General Electric Coverage. G. F. Province, 702 E. 2nd St., Carthage, Mo.

FOR SALE — Navy TBY trans-receiver, complete, with power supply, storage battery, antenna, phones, mike, key, and eight tubes, $50. John R. Greenwood, 406 Prospect Ave., Hackensack, N. J.

SALE OR TRADE — 4 x 5 Graflex (no lens); also a Mendelssohn Solenoid gun. Will trade for 4 x 5 Graphic film-pack adapter. Meyer Berk, 1318 Magee Ave., Philadelphia 11, Pa.

FOR SALE — Parts for portable battery-operated electronic photoflash units. Write for list. Berman Distributing Co., 1188 Broadway, Brooklyn 2, N. Y.

FOR SALE — Philco signal generator model 077 just recondtioned, $25. Superior Signaltracer model CA10, $5. Butler C. Clave, Route 2, Box 80B, Petoskey, Mich.

SELL OR TRADE — NRI, VTVM, in excellent condition, less tubes and batteries. Would like ham gear. Meredith Atkins, 110 North Ave., Sumner, Ill.

FOR SALE — Rider Chanalyst, slightly used, price $90. Victor 16 mm. model 40B sound projector, 2-case outfit, for $310. Yen Radio Service, Rockford, Mich.

SELL OR SWAP — Hanovia Ultra Violet Lamp. Several auto radios, quantity silver mica condensers. Want good enlarger and 35 mm. projector. V. Iavarone, 1218 Leland Ave., Bronx 60, New York City.

SELL OR TRADE — Professional Type Recorder; sixty foot television tower; Triplett 1503; 1 to 5 h.p. Circuit Breaker switches; Silver 909; BC 906C; Boonton Signal Generator. Reliable Radio, 118 Whiting St., Plainville, Conn.

FOR SALE — Have several 2-way Mobile FM radio telephone units. Operate on 11 meter phone band. Two channels. Each unit complete, less aerial, $99.50. C. E. Carlisle, Red Stone St., Forestville, Conn.

WANTED — An oscilloscope, any condition, any size. A L. Sebok, 1463 E. 115th St., Cleveland, Ohio.

SELL OR TRADE — Miscellaneous equipment. Write for list and complete information. Radio Electronics Co., 205 W. Broadway, Waukesha, Wis.

FOR SALE — Bendix 5 in. Oscilloscope model 160, 2 rectifiers, one 884 tube, 8 tubes in all; 1000 cycle FM oscillator, $90. Marion Radio & Record Shop, Marion, Va.

SELL OR TRADE — Clough-Brengle AC operated model OC Sig. Generator, not in good operating condition; Triplett Free Point Tester, 1220 C, perfect condition. Raymond Patterson, 518 Brown St., Winchester, Indiana.

SELL OR SWAP — NR-I Basic Radio Course; trade for good signal generator, standard make. Also have two good battery radios, in good operating condition. W. R. O'Neal, 246 Wine St., Mullins, S.C.

WANTED — 3-gang variable condenser for Motorola car radio, model 350. Cash or trade parts. Marion Wolff, 1718 Moyer Ave., Elkhart, Ind.

FOR SALE — Hallicrafters Skyrider Junior S-41G, covers 550 kc. to 30 mc. on 3 bands, 6 tubes—AC/DC 110 v. Slightly used, $25. Fred Shemanek, 6715 14th Ave., South Minneapolis 9, Minn.

FOR SALE — Miscellaneous radio equipment in good shape. Write for list. Reasonable price. Bryan Holcomb, 1107 No. Tenn St., McKinney, Texas.

FOR SALE — Press Credential and Identification Cards, wallet size, two colors, 25 cents each; 3 for 50 cents. Henry Lee, 495 Third Ave., New York 16, N. Y.

SELL OR TRADE — Drawing set, 13pc., Noris professional quality, nearly new, $25., or trade for receiver, test equipment or parts. Paul Bateman, Route 5, Box 316-A, Denver 11, Colo.

FOR SALE — Astatic microphone (model K2) with built-in switch and 25 in. of cable mounted on Atlas desk stand (Model DS-7). Like new. $15 plus postage. Radio Service Shop, 66 Clark St., Portland 4, Maine.

TRADE — One 16 mm. movie projector, like new. Would like amateur radio gear. Meredith E. Atkins, 110 North Ave., Sumner, Ill.

SWAP — Large quantity of Popular Mechanics, wireless equipment and tubes for a B.C. 348-RCVR. Maurice Philbrick, Box 26, Epsom, N. H.

FOR SALE — 1947 two-toned mahogany Runabout, 17 1-2 foot, 92 Chrysler marine. Guaranteed perfect, $2,600.00. J. B. Pratt, 3233 West Warren Ave., Detroit 8, Mich.

SWAP — Tubes and radio parts worth $95 for precision E200 Signal Generator. Charles W. Snyder, Box 565 Weissport, Pa.

WANTED — Position by Army Signal Corps veteran; desires employment as radio operator aboard ship or vessel. Travel anywhere. Antone L. Oliveria, 94 Potomska St., New Bedford, Mass.

FOR SALE — One Meissner 9-1040 Analyst in A-1 condition. Like new, $99.50. Harold H. Woodbury, Radio & Electrical Repairs, Pearisburg, Va.

WANTED — Power supply operating off 110 v. AC and supplying 12 v. DC. Meredith Atkins, 110 North Ave., Sumner, Illinois.

SELL OR TRADE — Two VHF receivers 100 to 160 meg., 110 AC, die cast chassis, micro tuning, 13 H.F. tubes in each set. Tuning graphs included; like new, in original cases. Alva Radio Lab, 712 Santa Fe St., Alva, Okla.

FOR SALE — Six 25 MMFD 10,000 Transmitting condensers. Five tube superhet AC-DC broadcast, and one short wave band. Al Schmidt, Box 5515, Daytona Beach, Florida.

FOR SALE — Type C-8 Homelite Electric Power Plant. 500 watt DC, 110 v., with case, like new. A bargain at $125. delivered. Curtis J. Cole, South Otselic, N. Y.

SELL OR TRADE — Large stereopticon lantern with Prestolite tank, electric line voltage regulator, carbons, 350 colored slides. Several extra lenses. Want radio equipment or manuals. Paul Stuart Jackson, 70 Syme St., Sharon, Pa.

SELL OR TRADE — One BC-454A Aircraft Receiver, complete, ready to operate. Ernest A. Sawyer, P.O. Box 346, Marshall, N. C.

WANTED — One model EC-1A Echophone used commercial receiver, must be in operating condition. Charles H. Russell, Radio Service Co., Fayetteville, Ala.

FOR SALE — Complete electronic laboratory and miscellaneous radio equipment, little used. Write for list. Terry Radio Service, 217 W. Shadeland Ave., Pleasantville, N. J.

SWAP — Radio magazines, Life magazines, electric shaver, radio parts, 4-tube radio. Want Nature Books, books on photography, home building, carpentry, masonry, etiquette, woodworking, interior decorating. Charles Morehead, Flat Lick, Ky.

SELL OR TRADE — Three volumes of H. W. Sam's Photofact Folders, 2 in binders and one in original envelope, $45, or trade for C-D BF-50 Capacitor Analyzer, etc. A. M. Bauman, 3701 No. Lowell Ave., Chicago 41, Ill.

FOR SALE — Hallicrafter S40 receiver and Millen R9'er, $80. Owen Hawkins, 310 East Main St., Middletown, N. Y.

FOR SALE — Radio technical books and Signal Corps hand-mike, new—$35. takes all. William H. Stidhem, 2354 36th Ave., San Francisco 16, Calif.

FOR SALE — Miscellaneous radio equipment. Write for list. E. S. Arnold, 24 Arch St., Meriden, Conn.

FOR SALE — Transmitter and Receiver, SCR, 284-A, complete. $50. f.o.b. H. E. Willey, 517 Esmeralda St., El Monte, Calif.

FOR SALE — 25 w. amplifier, tube checker, tubes. Back issues Radiocraft, Radio News, Service, C.Q., Q.S.T., Electronics, Tele-Teck, Radio Service Dealer, 10 cents each. Superb Radio Service, 1255 S. Kildare Ave., Chicago, Ill.

SELL OR TRADE — Precision series E 200 Signal Generator, cables and book. Like new. Factory checked. Seymour Bistreich, 992 Fox St., Bronx 59, New York.

SELL OR TRADE — CA-11 Signal tracer, instructions, used very little, $15 postpaid. Dixie Radio Shop, Jonestown, Miss.

SELL OR TRADE — Condx Abbott Tr- 4B Trans-RCVR, complete with Vibropack and mike, for WRL Globetrotter or DB 20 Preselector. Neiman Electronic, 433 1-2 Chestnut St., Pottstown, Pa.

FOR SALE — Miscellaneous radio equipment, ready to go on the air. Sam Torrisi, 57 Mechanic St., Lawrence, Mass.

FOR SALE — One used Phono-Recorder and PA System model 9-1065, good condition, with Turner microphone. Price $150. Tony Lopez, P.O. Box 792, Calipatria, Calif.

FOR SALE — Ecophone EC-3 Receiver. Covers .55 to 30. MC. Complete with tubes, Xtal filter and speaker. S. J. Stansfield, Box 6, Paw Paw, Mich.

FOR SALE — 35 mm. Argus A-2 Camera with case, like new. Price $30. J. Runowski, 9431 So. May St., Chicago 20, Ill.

WANTED — Position by young man; wishes position in electrical sales field. New England area desirable. Electrical Engineering degree. Bernt Midland, Box 182, University of Connecticut, Storrs, Conn.

FOR SALE — Scott Marine Radio Receiver, Model SLR-M, in perfect condition, including instruction book. Charles Kovacs, 173 Pennsylvania Ave., Phoenixville, Pa.

FOR SALE — One Echophone Commercial receiver model No. EC1A, in perfect operating condition; 3 bands including standard broadcast band. Price, $25 prepaid in USA. H. L. Inman, Boardman, No. Car.

FOR SALE — One Universal tube tester, model 501, Counter model, and one Superior Signal Generator, '45 model, both for $65. Wallace G. Kennedy, 3242 Fulton St., Brooklyn 8, N. Y.

WANTED — Stancor 10P Transmitter, must be in perfect condition. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N. Y.

WANTED — BC-683 receiver. Give lowest price in first letter. Stephen J. Kostka, 20-02 45th St., Long Island City 5, N. Y.

SELL OR TRADE — Thordason crystal controlled band switching transmitter full coverage. Howard Model 450A crystal phasing, 12 tubes. Swap for test equipment or photographic material and camera. Ben L. Sandberg, 932 Westbourne Dr., West Hollywood, Calif.

TRADE — Radio and Television books in good condition, over 60 books. Want Signal Generator or Oscilloscope. Gust Foradas Radio Service, 701 Rex Ave., N.E., Canton 4, Ohio.

FOR SALE — BC412B Oscilloscope reconverted with new stainless steel panel and good working order, $60 f.o.b. Gregorka Radio Service, Little Falls, N. Y.

TRADE — Wilarton Demagnetizer 115 v. 60 cycle, portable type, with Jewel pilot; rubber mount, almost new. Will trade for radio test instrument, camera, rod and reel, rifle, good binoculars. T. Wiskoff, 4624 E. 49th St., Cleveland 9, Ohio.

FOR SALE — Supreme 589A tube and battery tester, slightly used, $35. H. N. Goldberg, 4625 No. Lawndale Ave., Chicago Ill.

FOR SALE — Miscellaneous radio equipment. Write for list. Walter's Radio Service, 1252 Pulaski Ave., Shamokin, Pa.

WANTED — Instruction and technical manual of FM receiver BC-603 part of SCR 608 I. Susman, 1052 Blake Ave., Brooklyn 8, N. Y.

FOR SALE — National Radio Institute correspondence, NRI Service Manual, Ghirardi's Radio Trouble-Shooters Handbook. Everybody's Radio Manual. Simpson Meter, Model 260, almost new. All for $180. Edward C. Denny, 1708 No. Berwick, Indianapolis 8, Ind.

SELL OR TRADE — New converted BC-612, 5 in. Scope, $60, or trade for signal generator. Leonard P. Gau, Box 285, Pierz, Minn.

WANTED — Several 1F transformers. Advise as to number available, and price. Robert L. Edwards, Jr., 11,116 Midvale Rd., Kensington, Md.

FOR SALE — Can any one use a Penoscil-Lite type of signal generator? Only $4. T. Popel, 1223 Elm Ave., Brooklyn 30, N. Y.

FOR SALE — Many makes of standard radio chassis, power packs and other items. Send stamp for return Bulletin. Louis A. Goldstone, 1279 Sheridan Ave., Bronx 56, New York.

TRADE — Ladies or gents wrist or pocket watches, 7 to 17 jewels, all used. Want radio test equipment. Nichols Radio Shop, Box 100, Bisbee, Arizona.

SELL OR TRADE — Back issues of Radio Retailing, Radio Craft, and Radio News, magazines. Trade for radio tubes. Give list in first letter. Ellison Radio Service, Centertown, Ky.

FOR SALE — 10 in. RCA television set, ready to work, with console cabinet, $250. J. Bazewick, 3000 No. Christiana, Chicago 18, Ill.

FOR SALE — Miscellaneous equipment. Write for list. A. Bullhorse, 605 E. 168th St., Bronx 56, N. Y.

SELL OR TRADE — 2,000 IRC BTA Insulated resistors. Write for list or state amount needed. I. W. Stubblebine, 140 So. 4th St., Reading, Pa.

SELL OR TRADE — 10 in. 10BP4 Cathode Ray Tube, Blond 7 in. RCA cabinet in perfect condition. Thomsen, 43 Hero Rd., Fort Tilden, Queens, N. Y.

SELL OR SWAP — New Remington Foursome electric razor with 4 shaving heads. Need radio or electrical parts. Louis Mark, 322 Snediker Ave., Brooklyn 7, New York.

FOR SALE — A Crosley television receiver in brand new condition. Price $350. James Domino, 58-81 Maspeth Ave., Maspeth, N. Y.

WANTED — A-meter for a Radio City Multi-tester, model 409. Donner's Radio Service, 93 Hooker St., Allston 34, Mass.

FOR SALE — 1936 Ford Philco, Model FT-9, radio. COD $25. Perfect condition. G. La Maye, 548 E. 6th St., Erie, Pa.

WANTED — Television set or chassis in any condition. Please write. Henry Latko, 1922 Dickens, Chicago, Ill.

SELL OR TRADE — US Signal Corp Radio Receiver, Model BC 728A, with Willard battery (portable). John J. Levine, 15-17 Kelley Square, Worcester 4, Mass.

FOR SALE — Milen Vari-arm ECO Model 90700. 80 and 40 meter output. $30. H. D. Clark, Jr., 32 Hampton Place, Nutley 10, N. J.

WANTED — Small 110 AC motor, reduction gear about 80 rpm. Give full particulars and lowest price. Horace W. Leeds, 15 West 15th St., Ocean City, N. J.

WANTED — Good name brand microscope. No junk. Eddie Howell, General Delivery, Gastonia, N. C.

WANTED — Position as assistant radio repairman. Graduated radio school; six months' experience. Joseph Rasulo, 1048 59th St., Brooklyn 19, N. Y.

SELL OR TRADE — Hanovia ultraviolet prescription model sun lamp and goggles. Need quick change lathe or any other light machine tools. J. O. Bennett, 1960 80th St., Jackson Heights, New York, N. Y.

WANTED — Two good Fidelity 16 ohm, 12 in. permanent magnet speakers, for 16 mm. sound projector. Frank W. Jones, Gabbs, Nevada.

FOR SALE — GE Tube Tester, Rider's Manuals, Vols. 9 to 15, and good supply of tubes, like new, cheap. Arthur Hosey, Box 281, Sylacauga, Alabama.

FOR SALE — New and used everything in 32 volt electrical equipment. Porter Electric Shop, 487 East Main St., Chillicothe, Ohio.

FOR SALE — Navy war-surplus Memovox dual recorder installation. Write for details. Union College, Schenectady, N. Y.

FOR SALE — Collection of Radio Craft magazines and radios. A. Lago, 92 Andrew St., Bayonne, N. J.

WANTED — Address of E. Vockeroth; please write immediately. Interested in your gear. Eddie Howell, Gen. Del., Gastonia, N. C.

FOR SALE — Chicago Volt, Ohm, Milliammeter, AC and DC, model 431. Harry M. Books, Jr., 318 11th St., New Cumberland, Pa.

WANTED — McMurdo-Silver 701 75-watt transmitter. Will swap Millen Exiter, like new, with tubes and coils. Morton Bardfield, 4 Brinsley St., Boston 21, Mass.

SELL OR TRADE — RCA 500-watt transmitter with tubes; good condition. ABC Radio and Electric Service, Cumberland Gap, Tenn.

SELL OR SWAP — Two GE Unimeters. J. W. Horton, 1066 So. Grove St., Irvington 11, N. J.

FOR SALE — Speech and music amplifier, two speech and one phono inputs, 500 ohm outptut and two dynamic output sockets. Price $15 plus postage. Raymond F. Irby, 321 W. Brandeis, Louisville 8, Ky.

WANTED — 3-gang condenser. Write for particulars. N. W. Nordstrom, 15 E. Artavia St., Duluth 2, Minn.

WANTED — Complete radio service equipment, with small to medium size work bench. Walter E. Brown, 1505 Metropolitan Ave., Bronx 62, New York, N. Y.

FOR SALE — Eleven different radio books. Complete list sent upon request. J. S. Lowe, 4509 White Ave., Baltimore 6, Md.

FOR SALE — Copies of radio magazines. Write for list. G. W. Garrison, RD No. 1, Mt. Pleasant, Pa.

WANTED — Transmitter. Have various items to trade along with cash. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N. Y.

FOR SALE — Used Nestor Johnson North Star tubular skates. Men's sizes 8 to 9. Price $10. pair. Rome A. Schaffner, 2675 Wetherby Rd., San Marino 9, Calif.

FOR SALE — Supreme Model 599 Tube and Set Tester. Like new in all respects. Price with test leads $50. Louis J. Bochet, 799 Summer Ave., Newark 4, N. J.

FOR SALE — 250 watt A.M. composite transmitter, like new. Approved by FCC. Cost $2,700. Complete with tubes but not crystal. Will sell for first check for $1,400. Max Chambers, Preston, Md.

FOR SALE — Transmitter, ready to operate. Everything in excellent working condition, $25. L. E. Klingberg, 3535 W. 109 St., Inglewood, Calif.

WANTED — Auto radios, complete with cables and tuning heads. Radio Repair Service, 211 Farren Ave., New Haven 13, Conn.

FOR SALE — Model 955 Hickok set checker, $35., and model 636 Jackson tube checker, $45. Samuel D. Canitia, 3642 E. 120 St., Cleveland 5, Ohio.

WANTED — Ghirardi's and Rider's radio books. Julius Zimmerman, 232 So. 1st St., Brooklyn 11, N. Y.

SELL OR SWAP — Supreme multiwave signal generator. Wanted—Signal tracer or ham gear. Lloyd Bobo, 308 Riverside, Canon City, Colo.

FOR SALE — Radio tubes, in sealed cartons. Send for what you want. Charles C. Butler, 16104, So. Main, Gardena, Calif.

WANTED — Small transmitter. Have items to trade. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N. Y.

FOR SALE — Presto K recorder, complete with microphone and stand. Ed. Adler, 267 W. 19th St., Holland, Mich.

SELL OR SWAP — Radio magazines. Write for list. Want good film-pack camera. Murray Barlowe, 880 59th St., Brooklyn 20, N. Y.

TRADE — Violin, guaranteed by store where purchased, complete with bow and case, for a Hickok 534P combination tester. A. A. Hale, 357 East Park Blvd., Akron 5, Ohio.

SELL OR TRADE — Leitz microscope, 3 turret nose piece with oil immersion lens. High and low power lenses in wooden case. Plus a Simpson V.O.M., for a HQ129x or SX28A. Theodore Nades, 5101 39th Ave., Sunnyside 4, Long Island, N. Y.

FOR SALE — Large assortment radio equipment. Write for list. L. J. Brennan, 799 Silvercrest Ave., Akron 14, Ohio.

FOR SALE — Shrunken Japanese head, $12; Jewell signal generator, $10; Precision multimeter, series 830, $6. J. L. Miller, 1017 Cedar, South Bend, Ind.

SELL OR TRADE — New Emerson 3-way portable, 3-gang condenser, Zenith 3-way portable, like new; 2-power amplifiers, new Feiler signal tracer TS2, some used speakers. Want test equipment, manuals, binoculars, 16 mm. projector, or what have you? Walt's Radio Service, 1801 Illinois Ave., Lansing 6, Mich.

ANNOUNCING — Free evening courses in code and free code practice. For complete details, send stamped self-addressed envelope to Leon S. Recht, Bryant Youth and Adult Center, 4810 31 Ave., Long Island City, N. Y.

FOR SALE — Weston meters and an Arbor press, 2,000 lbs., 10 in. capacity; also Bolex H-16 movie camera. All new condition. Write for details. H. W. Shaw, 300 Spirea Dr., Dayton 9, Ohio.

SELL OR TRADE — Radio books. Want Rider's manuals, Vol. IV, VI, & XI to date; describe. Will trade and exchange lists. James Z. Cole, 634 Elmwood Ave., Niagara Falls, N. Y.

FOR SALE — Brand new Kueffel and Esser Polyphase Slide-rule, complete with trig and log scales, $10. Charles H. A. Heitzeberg, 4532 Arco Ave., St. Louis 10, Mo.

FOR SALE — Rider's manuals and assortment radio equipment. Perfect condition. Electrical & Radio Clinic, 43 Sewall St., Augusta, Me.

FOR SALE — Precision radio instruments. Write for full particulars. Joseph Truce, Aurora, Ohio.

FOR SALE — Twenty-watt, transformer coupled, mobile public address system. J. Bradley, 430 Harvard Pl., Ontario, Calif.

WANTED — A set or sets of language self-training records, with or without phonograph. Swedish and Italian records desired. C. W. Winchell, 297 Euclid Ave., Hackensack, N. J.

FOR SALE — Complete Clinical Chemical laboratory equipment with reagents, etc. Send card for inventory list. C. W. Winchell, 297 Euclid Ave., Hackensack, N. J.

SELL OR SWAP — Radio equipment. Write for details. T. Franklin Waters, 200 Drummond Pl. 2-A, Norfolk 7, Va.

FOR SALE — Soldering Gun, flash model 75, pistol grip, light weight, and perfectly balanced. Henry Lee, 495 Third Ave., New York 16, N. Y.

FOR SALE — Radio equipment. Write for list. John R. Kroemer, 1445 No. Humboldt St., Milwaukee 2, Wis.

SWAP — Will give Rider's Manuals, Vols. 1, 2, and 3 in good condition. Want Vols. 10, 11 or 12. Foster L. Burgess, Box 684, Norwich, Conn.

WANTED — Radio and electrical appliance business somewhere in the Western States. Mr. E. Robert Law, 187 E. Roosevelt Blvd., Philadelphia 20, Pa.

SELL OR SWAP — One GI record changer, recorder combination in cabinet, less amp. Never used. What have you? Walter Ninneman, Auburndale, Wis.

FOR SALE — Magnatrons, two WE 706 FY, like new. Two new 705A high vacuum rectifiers, 35,000 volts inverse peak voltage. The lot for $20. L. A. Sutherland, 3745 S. E. Grant St., Portland 15, Oregon.

SELL OR SWAP — Kodiak Medalist Camera, flashgun, tripod, Dejur meter and Underwood standard typewriter, rebuilt. Could use testing equipment, woodworking power tools, radio parts. R. W. Blankshain, 931 Franklin St., Ogdensburg, N. Y.

FOR SALE — RCA personal portable four-tube radio, like new. Information on request. M. L. Blanchard, 662 E. Cottage Ave., St. Paul 6, Minn.

FOR SALE — Brand new Brush "Soundmirror," complete. Forced to sell account embargo to Palestine. Heller, P.O. Box 1893, Cleveland 6, Ohio.

FOR SALE — Audio frequency oscillator, Jackson model No. 652 (new). Audex cutting head model No. T-10 (new). 50 watt Western Electric Amplifier model No. II8A. Lafayette 22 watt amplifier model No. 417. Collection of Radio News, Radio Craft, etc., to 1939. Crosley Facsimile Printer. C. H. Wallace, 532 Foster Rd., Staten Island 12, N. Y.

FOR SALE — Linguaphone code course, five 10 inch records, album, instruction manual. Perfect condition, used only twice. $8.75 prepaid. Milo G. Burston, 320 Tawas St., Alpena 3, Mich.

FOR SALE — Radio parts and equipment. Write for list. Stathis Linardos, 190 Wadsworth Ave., New York City 33, N. Y.

FOR SALE — Complete radio servicing business. Good stock of tubes, parts and test equipment. One-half off list on everything. Buyer must take all. About $1,500 will cover. Write P.O. Box 153, Lebanon, Pa.

WANTED—Address of ex-S/Sgt. James W. Griffin. Urgent. Eddie Howell, General Delivery, Gastonia, N. C.

SELL OR TRADE—Brand new National NC53 receiver. Sell at $65. Need Altec Lansing speaker or good AM-FM tuner or radio. R. Aimone, 10 Thomas St., New York 7, N. Y.

FOR SALE — Two brand new Webster automatic record changers, model 26, in original cartons. $40 each, postpaid. Broadway Radio & Electric Service, 693 N. Broadway, East Providence, R. I.

FOR SALE—Sam's "Photo Facts" Vol III Like new. Complete set of folders $15. or offer. Ralph Cruz, 11 Calhoun St., Aurora, Ill.

FOR SALE—Triplett Model 2400 Electronic VOM and Superior Model 450 tube tester. Best offer or trade for Model S-40A Hallicrafters Communications Receiver. S.A. Casson, 606 S. Alexander St., New Orleans, La.

FOR SALE— One set of Lionel Elec. Trains, engine and two cars, with transformer. Fair condition. Price $10. J. S. Lowe, 4509 White Ave., Baltimore 6, Md.

FOR SALE—Back issues of technical magazines, radio, engineering, etc. Also, books (excellent condition): engineering, radio, technical, mathematics. Write, stating wants. P. O. Box 2707, Paterson, New Jersey.

FOR SALE OR TRADE—Bliley SMC 100 calibrator crystal, new, $5.50; Hickok Model 43 wattmeter, 750 watts, A.C.-D.C. 150 volts, 5 amps, $19.20; Hickok Model A.C.-51 tube checker, modernized, $55. A. R. Satullo, 7635 E. Jefferson, Detroit, Mich.

WANTED—2 Tuning units, TN16/APR4 Range, 38 to 95 M.C.; Also 2 APR4 receivers. Murray J. Douglas, Box 506, Concord, Calif.

FOR SALE—N.R.I. A.M.-F.M. Radio and television course, leatherette binders, like new, 65 lessons with model answers, 37 job sheets, 11 reference lessons, 2 date sheets. $35. prepaid. Ralph R. Shaffer, 922 No. Haskill Ave., Dallas 4, Texas.

SELL OR TRADE—New 22 jewel Hamilton, Air Force, pocket watch; 8 mm movie camera; 8x30 binoculars; field glasses with case; want commun. rec., like N.C.-100-SX-28. Fred Simonian, 85 Shepard St., Lynn, Mass.

FOR SALE—Supreme service Manuals 1929-41, Philco 1939-40, Mallory 4th edition Radio Encyclopedia, in perfect condition, very reasonable. Joseph Truce, Aurora, Ohio.

TRADE—30 watt amplifier, 110V with electro-voice mike, model V-1, with 20 ft. cable. Amplifier includes mike,2 12" speakers with cable. Also GE wireless phono. Want electric recorder. Bennie L. Merritt, Jr., Camilla, Ga.

FOR SALE—Riders' vol. 5-8 used very little $36. 1 Trouble Shooters' Guide like new $2.75. 1 32 volt 1000 watt ball bearing generator with switchboard & instruments $20.00. 1 Superior Chan'l Analyzer & vacuum tube voltmeter $17.50. D. L. Hansen, Box 273, Coleraine, Minn.

SALE OR TRADE—RCA mod. 158 oscilloscope like new, orig. carton. Want Leica photo equip., 16 mm movie equip., good communication rec., binoculars, or vac. tube voltmeter. Beverly Hills Radio Co., 9138 W. Olympic Blvd., Beverly Hills, Cal.

FOR SALE—New Remington portable typewriter $18. below cost price. Write M. Levengood, Sheridan, Pa.

FOR SALE—Mike desk stand with metal base and wood shaft, finished in gloss brown and rubber ring on base. Price 79c each. I. Susman, 1052 Blake Ave., Brooklyn 8, N. Y.

FOR SALE OR TRADE—3-way portable, tube tester, typewriter, duplicator, movie projector, printing press, etc. E. G. Bartlett, Atlanta, Mo.

SWAP—8 books on Radio Servicing, all different, value $40 for test equip. or what have you? F. Cabon, 1504 La Baig, Los Angeles 28, Cal.

SELL OR TRADE—Superior signal tracer C-all $13 Also Bernard volt-ohm-milliammeter with burned out 0-1 D.C. Ma. Make offer. Will trade any of above for Sam's manuals or what have you? Better Radio Service, 1601 Williams St., McKeesport, Pa.

FOR SALE—Simpson Meters 281,2,3 in carrying case, excel. condition $25 Will consider trade for signal gen. Charles F. Moriarty, 394 Liberty St., Springfield, Mass.

WANTED—Radio books, including Marshall's Elements of Practical Radio Mechanics, Rider's Servicing by Signal Tracing, Drake's Cyclopedia & all Ghirardi's radio books. Must be reasonably priced. Walter J. Bartell, 1107 N. Western Ave., Chicago 22, Ill.

WANT—Leica or Contax camera, or com. receiver. Will swap German field telescopic binoculars 10x80, minus tripod. Need also Eimac 4-250A tubes. C. Borysevich, 1066 President St., Brooklyn 25, N. Y.

FOR SALE—Approved model 100 signal gen. in excellent condition. Also "Micro 16" camera like new, for sale to highest offer. Bernard Berman, 88 Stagg Walk, Brooklyn 6, N. Y.

FOR SALE—Large amount of 4 inch P.M. speakers, 4 ohm V.C. Magnets and frames perfect but need cones. Trade or sell, make offer. Ralph Cramer, R.F.D. 2, Hicksville, L. I., N. Y.

FOR SALE OR TRADE—1941 N.R.I. course with questions and answers. J. Mayer, 6215 Patterson Ave., Chicago 34, Ill.

FOR SALE—New, slightly used BC610E transmitter with deluxe speech amplifier and control panel, complete. $750 or best offer. New, slightly used HQ129X $150 Harry L. Landau, 104 McLaren St., Red Bank, N. J.

WANTED—Used code course, records or machine and tapes. Richard Cerni, 585 Washington St., Brighton, Mass.

FOR SALE—10 meter transmitter, 10 watts for mobile or fixed station. Complete with tubes and crystal, no power supply. Beautifully built on chromium chassis. Frank Bou, c/o Bot. Dept. U. of Pa., 38 Woodland Ave., Philadelphia 4, Pa.

TRADE—Thordarson transformer with 140 V. A. Pri. 110V 60 cy. 6,000V Sec. This transformer has 3 separate windings. What have you? V. D. Kinard, 1110 W. 4th, Big Spring, Texas.

WANTED—Capehart "turnover" type record changer. Advise condition, model and type pickup. H. Q. Duguid, 3443 Arbor St., Houston 4, Texas.

WANTED—Any amount C7½ assort. colors Christmas lights, 110 A.C. Will pay 10% over cost plus shipping. Sheboygan Radio & Appliance Co., 2314 N. 15th, Sheboygan, Wis.

FOR SALE—50L6, 70L7, 12SK7 and 3S4 radio tubes. All first class tubes, 79c ea. post paid. Write for quantity prices. Jones Radio Co. Box 93, Rt. 1 Douglassville, Pa.

FOR SALE—Rider's Manuals 1, 2, 3, 6, and 7, all for $25 Also several cheap used radios, all working. Send for list. Hamilton Radio Service, Spirit Lake, Iowa.

FOR SALE—Model 542 Supreme pocket multimeter. Used only a few times. $15 Henry Searles, 1 Pitt St., Charleston 28, S. C.

TRADE—Copies of Radio News, 1945-48 for copies of radio magazines issued 1920's-early 30's. Gerald Spector, 158 Chestnut St., Lakewood, N. J.

SELL OR TRADE—Signal tracer, $12.50 also radio parts and tubes. Send for list. Trade for complete correspondence course in radio. Marvin Weber, 3419 Butler, Fresno, Calif.

SELL OR SWAP—17 tube 7" TTI television set built from kit, in working order, incl. CRT. Will trade for good 16 mm movie projector or cash. Roger Kolh, 343 Main St., Pennsburg, Pa.

URGENT—Information wanted on conversion or other data on ARC-4, will buy or borrow. C. H. Harp, Crescent, Okla.

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CLARENCE E. BOWER of Tampa, Florida
casts us a line about his service experiences

Clarence writes: *"I have been an ardent admirer of Cornell-Dubilier since I first came across them many years ago... in the radio game since 1909... your condensers have always given me a feeling of security and satisfaction. Your Micas in the high voltages are really 'the stuff' and have always been my first choice."*

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